DOCUMENT RESUME

ED 306 135 SE 050 542

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TITLE	Increasing Minorities' Mathematics Preparedness: The College Readiness Program.
PUB DATE	29 Mar 89
NOTE	8p.
PUB TYPE	Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Blacks; *College School Cooperation; Cooperative Programs; *Hispanic Americans; Junior High Schools; *Mathematics Achievement; *Mathematics Curriculum; Mathematics Education; Mathematics Instruction; *Minority Groups; Secondary Education; *Secondary School Mathematics
IDENTIFIERS	*California

ABSTRACT

Black and Hispanic students have historically been underrepresented at state universities in relationship to the percentage of the population of these minorities in the state at large. With the increase of requirements from two to three years of high school mathematics, there is real concern that this underrepresentation will continue to worsen. The College Readiness Program (CRP) is intended to assist Black and Hispanic students in grades 6-8 achieve competence in higher order cognitive skills, and prepare them for enrollment in a high school college preparatory curriculum in mathematics. The CRP is unique in three respects: (1) supplementary/remedial curriculum; (2) focusing motivation and support; and (3) developing a partnership among middle-grade schools and universities. The selection method of participating schools and university student tutors, and evaluation method are described. The results going into the third year of implementation have been very promising in terms of enrollment in Algebra I, standardized test scores, and student attitude toward the program. The educational significance of the program is discussed. (YP)

Increasing Minorities' Mathematics Preparedness: The College Readiness Program

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March 29, 1989

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The College Readiness Program (CRP) is intended to assist Black and Hispanic students in grades 6-8 achieve competence in higher order cognitive skills, and prepare them for enrollment in a high school college preparatory curriculum in mathematics. The Program is a joint effort of the California State University System (CSU) and the California State Department of Education (SDE).

Objectives

Black and Hispanic students have historically been underrepresented at state universities in relationship to the percentage of the population of these minorities in the state at large. With the increase of requirements from two to three years of high school mathematics, there is real concern that this underrepresentation will continue to worsen. The goal of the CRP is to significantly increase the pool of Black and Hispanic students that are eligible to enter the CSU upon the completion of their high school program. The long range objectives of this project are:

1. To significantly increase the number of Black and Hispanic students that successfully complete at least Algebra I, Geometry and Algebra II, and
2. To significantly increase the awareness level and motivation of Black and Hispanic students in pursuing career options that have college preparatory mathematics as an entrance requirement.

Perspective

Students with good performance (above grade level) in mathematics can readily adjust to the increased college entrance requirements based on being informed, and historically, most of these students have been entering college all along. To meet the goal of significantly increasing the pool of eligible Black and Hispanic students, it is the average performance students that must be encouraged and assisted in developing the necessary higher order cognitive skills so that they are both eligible and can be successful in completing the college preparatory curriculum in mathematics. This means that these students need to have these skills when they enter high school, thus the middle school experience is very critical. It is also in these grades where the highest casualties in mathematics occur.

The College Readiness Program is unique in three respects. First, *it is not intended to take the place of the regular school curriculum or provide remedial education.* The CRP enrolls students of average performance (about at grade level) who have the ability to attend college, and seeks to provide the extra academic support that could be crucial to college matriculation. Mathematics educators train selected student teachers or college student interns to work with small groups of middle grade students after school on such cognitive skills as: developing understanding of concepts through use of concrete materials, on improving problem solving and estimation skills through experiences with various problem solving and estimation strategies, and developing good mathematics study skills.

Second, *the CRP focuses on student motivation and support*. The overriding assumption is that these students can and will attend college. Visits to CSU campuses and other school-based activities familiarize parents and students with college admission requirements, career entry

requirements, and financial aid programs. Moreover, the CSU students who serve as tutors are chosen, in part, because of their success in a mathematics related major in college, and are expected to act as positive role models.

Third, *the program seeks to develop a partnership among middle-grade schools and CSU campuses, and unites CSU campuses and middle grade schools in working toward the common goal of increasing the college matriculation of minority students.* CSU faculty train and supervise the CSU students who work as tutors. Coordinators at the middle grade schools organize student tutoring sessions and parent meetings. Both activities are necessary to CRP's success, and to establish a common ground between California Post-Secondary and K-12 educational systems.

Methods

Five CSU campuses (Hayward, Fresno, San Jose, Northridge, and Dominquez Hills) currently participate in the program and coordinate services to 21 middle grade schools distributed in the service area of these campuses. The middle grade schools were selected competitively on the basis of an enrollment of at least 500 students, 40% of the student population had to be Black or Hispanic, and the schools had to incorporate an 8th grade.

Sixth or seventh grade students are selected by the personnel of the individual middle schools each year to begin the CPR program that continues through the eighth grade. CTBS and teacher recommendations are generally used to pick students that are performing about at grade level in mathematics. Over the first two years, the CRP population has been approximately 54% Hispanic and 46% Black students. Whether calculated on a per-school or population basis, 55% of the CRP students were achieving at grade level, 20% were described as achieving below grade level, and 25% were described as achieving above grade level.

CSU student tutors are selected on the basis of their mathematics preparation (most are not mathematics majors), personality, interest in working with middle grade students, and the degree with which they can be a role model to the middle grade students. Mathematics educators train the CSU student tutors on a weekly basis in methods of teaching mathematics, with special emphasis on cooperative learning, problem solving, estimation activities, and mathematics study skills. CSU faculty provide all instructional materials for use with the middle grade students. Typically, each CSU student tutor works with 4-6 middle grade students one to two hours weekly after school from October through May.

Each CSU Student Affirmative Action Office provides coordination between the CSU campus and the middle schools, plans and carries out parent night activities, coordinates on-site supervision, and provides for student visits to the CSU campus, including Saturday Colleges with CSU faculty from Schools of Science and Business.

Evaluation

An ongoing evaluation is focusing on program outcomes, context, and process. Archival data (grades, California Achievement Test scores, attendance, conduct, referrals, etc.) are being collected on each student participating in the CRP and on a comparison sample of students who would have been admitted to CRP, had space and resources been available. Longitudinal analyses of these data are reported yearly to allow for both yearly assessment and long range assessment of program impact.

In addition, students are tracked from the time they enter CRP until they leave their high school. Students fill out a survey at the end of every year to measure attitudes toward CRP, mathematics, and career options. (This is the third year of data collection.)

Finally, questionnaires were developed by the external evaluator and are completed yearly by middle grade site coordinators, CSU campus coordinators, CSU participating faculty, and CSU student tutors. Questionnaire items seek to reveal participants' attitudes toward the program, perceptions of program impact, suggestions for improvement, and descriptions of program events.

Results/Conclusions

The results going into the third year of implementation have been very promising. Compared to regular eighth grade students, CRP students are more than twice as likely to be recommended for enrollment in Algebra I. Seventeen of the twenty-one middle grade schools had both complete data and an 8th grade CRP program. A correlation statistic was calculated between the percent of CRP students achieving above grade level and the percent of 8th grade CRP students recommended for Algebra I. The correlation between percent of students above grade level and Algebra I enrollment was -.02 ($p = .48$, one-tailed). This suggests that the effect of CRP, not the quality of the student, accounts for enrollment in Algebra I. This is even a conservative conclusion since CRP students were counted in the general population of 8th graders, so their relatively higher enrollment percentage contributed to the enrollment rate for all 8th graders.

During the 1987-88 school year, 59% of the CRP students were recommended for Algebra I/Geometry as compared to 54% of the comparison students. Once enrolled in Algebra I/Geometry, the CRP and comparison students did not differ statistically in the grades they received.

A significant ($p < .05$) increase has been found in the CRP students' California Achievement Test comprehensive scores over the control group of students both from seventh to eighth grade, and eighth to ninth grade.

Because of the nature of the data, it is not possible to know whether one aspect of the program or all aspects in combination have contributed to the increase. However, a conservative assumption is some aspects of CRP have made positive contributions to some of the students while at least one aspect of CRP has made a positive contribution to almost every student.

A substantial majority of CRP students surveyed were enthusiastic about the impact of the program on their academic achievement and desire to attend college. Specifically, the following percentages of CRP students agreed or strongly agreed with the following statements (data available from 3 schools only): CRP helped me to learn and understand math better (85%), and CRP increased my desire to go to college (92%).

Educational Significance

The College Readiness Program is a collaborative approach to trying to solve a very critical problem of society. The necessity of access to a college degree in a normal amount of expense of time and resources is critical for many Black and Hispanic students. Their economic opportunities most especially are opened or closed on the basis of their mathematics background. This problem cannot be solved at the college level and it is very difficult to have students in high school to complete Algebra I, Geometry, and Algebra II without the cognitive skills and motivation developed beforehand to be successful in mathematics. The CRP program, thus far, seems to be successful in helping many average performance students to be in a position to exercise all their career options. Only after five to ten years can hard conclusions be drawn on the effectiveness of this program. But as the third year of data collection begins, there is optimism that this approach could make a significant difference.